

### REMARKS

Claims 3-23 and 25-27 remain pending herein.

Attached hereto as pages 9-12, pursuant to Rule 1.121(c)(1)(ii), is a marked-up version of the amended claims.

The November 21, 2002 Office Action contains an objection based on an assertion that claim 4 is a substantial duplicate of claim 3. In view of the amendments set forth above, it is respectfully submitted that claim 3 is not a substantial duplicate of claim 4.

Reconsideration and withdrawal of this objection are requested.

The November 21, 2002 Office Action further contains an objection based on the assertion that claim 5 is a substantial duplicate of claim 6. In view of the amendments set forth above, it is respectfully submitted that claim 5 is not a substantial duplicate of claim 6. Reconsideration and withdrawal of this objection are requested.

Claim 12 was rejected under 35 U.S.C. § 112, second paragraph. The Office Action includes a statement that claim 12 contradicts base claim 1 in that, for the aluminum tabs of both the positive and negative electrode, claim 1 recites a cross-sectional area of not less than  $0.009 \text{ cm}^2$ , while claim 12 recites that the cross-sectional area is not less than  $0.008 \text{ cm}^2$ . In response, claim 12 is amended as set forth above to recite that the relevant cross-sectional area is not less than  $0.009 \text{ cm}^2$ . Reconsideration and withdrawal of this rejection are requested.

Claims 1, 3, 4, 7 and 16-23 were rejected under 35 U.S.C. § 102(b) over Japanese 8-185850 (JP '850). Claim 1 is cancelled as set forth above. Claim 4 recites a lithium secondary battery comprising a wound electrode body (including a positive electrode, a negative electrode and a separator), an organic electrolyte, a plurality of positive electrode tabs connected to the positive electrode and a plurality of negative electrode tabs connected to the negative electrode. A total cross-sectional area of all of the positive electrode tabs connected to the positive electrode is not less than a total cross-sectional area specified in claim 4 (based on the metal out of which the tabs are made), and a total cross-sectional area of all of the negative electrode tabs connected to the negative electrode is not less than a total cross-sectional area specified in claim 4 (based on the metal out of which the tabs are made).

JP '850 uses an extended portion of a laminated electrode as a lead. JP '850 fails to disclose or suggest tabs *connected* to the respective electrodes. This distinction is very

as a lead in a wound electrode (claim 4 is directed to a wound electrode), it would be difficult to assign the lead to a predetermined portion in winding the electrode. Furthermore, removing a portion of an electrode in order to create a lead (or extended portion) as disclosed in JP '850 would result in significant material waste as well as great inconvenience and inefficiencies in manufacturing the batteries.

Claim 7 recites a lithium secondary battery comprising an electrode body (including a positive electrode, a negative electrode and a separator), an organic electrolyte, a plurality of positive electrode tabs connected to the positive electrode and a plurality of negative electrode tabs connected to the negative electrode.

As noted above, JP '850 uses an extended portion of a laminated electrode as a lead, and JP '850 fails to disclose or suggest tabs *connected to* the respective electrodes. As also discussed above, this distinction is very significant, because removing a portion of an electrode in order to create a lead (or extended portion) as disclosed in JP '850 would result in significant material waste as well as great inconvenience and inefficiencies in manufacturing the batteries.

Each of claims 3 and 16-23 ultimately depend from claim 4 or claim 7, and therefore are distinguished from JP '850 for the same reasons discussed above with respect to claims 4 and 7.

Reconsideration and withdrawal of this rejection are requested.

Claims 8, 12-15 and 25-27 were rejected under 35 U.S.C. §103(a) over JP '850. The November 21, 2002 Office Action contains statements to the effect that JP '850 states that tab cross-sectional area should be selected in proportion to the resistance of internal components of the battery, and that the use of the word "units" in JP '850 would have suggested that the resistance values of the tabs should be substantially identical. None of such disclosure relates to or removes the distinctions discussed above between claims 4 and 7 relative to JP '850. Accordingly, the subject matter of claims 8, 12-15 and 25-27 would not have been obvious in view of JP '850 for the reasons discussed above in connection with claims 4 and 7, from which each of claims 8, 12-15 and 25-27 ultimately depend.

Reconsideration and withdrawal of this rejection are requested.

Claims 5, 6, 10 and 11 were rejected under 35 U.S.C. §103(a) over JP '850 in view of U.S. Patent No. 5,849,431 (Kita '431).

The November 21, 2002 Office Action contains statements that Kita '431 discloses that it is possible to minimize internal resistance by increasing the number of tabs. Such disclosure does not relate to or removes the distinctions between claims 4 and 7 relative to JP '850. Accordingly, the subject matter of claims 5, 6, 10 and 11 would not have been obvious in view of JP '850 for the reasons discussed above in connection with claims 4 and 7, from which each of claims 5, 6, 10 and 11 ultimately depend.

Reconsideration and withdrawal of this rejection are requested.

Claim 9 was rejected under 35 U.S.C. § 103(a) over JP '850 in view of U.S. Patent No. 597,969 (Ferguson '969). Ferguson '969 is cited for alleged disclosure of providing a tab fuse with a narrow portion. Such disclosure does not relate to or removes the distinctions between claim 7 relative to JP '850. Accordingly, the subject matter of claim 9 would not have been obvious in view of JP '850 for the reasons discussed above in connection with claim 7, from which each of claim 9 ultimately depends.

Reconsideration and withdrawal of this rejection are requested.

In view of the above, claims 3-23 and 25-27 are in condition for allowance.

If the Examiner believes that contact with Applicant's attorney would be advantageous toward the disposition of this case, the Examiner is herein requested to call Applicant's attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,



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February 21, 2003

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# VERSION WITH MARKINGS TO SHOW CHANGES MADE

3. (Twice Amended) The lithium secondary battery according to claim 1~~22~~, wherein a thickness of a tab is not more than twice a thickness of an electrode active material layer in an electrode to which the tabs are welded.

4. (Amended Three Times) ~~The~~ A lithium secondary battery ~~according to claim 1,~~  
~~wherein, comprising:~~

an internal electrode body including a positive electrode, a negative electrode, and a separator, the positive electrode and the negative electrode being wound with the separator so that the positive electrode and the negative electrode are prevented by the separator from coming into direct contact with each other;

an organic electrolyte; and

at least a plurality of positive electrode tabs connected to the positive electrode and at least a plurality of negative electrode tabs connected to the negative electrode for current collecting, a thickness of a said tab is being not more than twice a thickness of an electrode active material layer in an electrode to which the tabs are welded,

a total cross-sectional area of all of the positive electrode tabs connected to the positive electrode being not less than a constant area in accordance with the quality of the material to be used for the tabs, said tabs connected to the positive electrode being selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than 0.009 cm<sup>2</sup>, copper tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than 0.005 cm<sup>2</sup> and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than 0.004 cm<sup>2</sup>;

a total cross-sectional area of all of the negative electrode tabs connected to the negative electrode being not less than a constant area in accordance with the quality of the material to be used for the tabs, said tabs connected to the negative electrode being selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than 0.009 cm<sup>2</sup>, copper tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than 0.005 cm<sup>2</sup> and nickel tabs wherein a total

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cross-sectional area of all of said tabs connected to the negative electrode is not less than 0.004 cm<sup>2</sup>.

6. (Twice Amended) The lithium secondary battery according to claim ~~4~~22, wherein a sum of resistance value of the tabs per a unit battery is not more than 1 mΩ.

10. (Amended) The lithium secondary battery according to claim ~~4~~4, wherein internal resistance is not more than 10 mΩ per a unit battery.

12. (Amended Four Times) The lithium secondary battery according to claim ~~4~~4, wherein said tabs connected to the positive electrode are selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than ~~0.008~~0.009 cm<sup>2</sup> and not more than 0.36/R (cm<sup>2</sup>), R being internal resistance, in mS, of a unit battery, copper tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than 0.005 cm<sup>2</sup> and not more than 0.18/R cm<sup>2</sup>, and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than 0.004 cm<sup>2</sup> and not more than 0.14/R cm<sup>2</sup> and wherein said tabs connected to the negative electrode are selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than 0.008 cm<sup>2</sup> and not more than 0.36/R (cm<sup>2</sup>), copper tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than 0.005 cm<sup>2</sup> and not more than 0.18/R cm<sup>2</sup>, and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than 0.004 cm<sup>2</sup> and not more than 0.14/R cm<sup>2</sup>.

14. (Amended) The lithium secondary battery according to claim ~~4~~4, wherein deviation of respective resistance values of the tabs remains with  $\pm 20\%$  of an average value.

16. (Twice Amended) The lithium secondary battery according to claim ~~4~~4, wherein said battery further comprises a positive terminal and a negative terminal, and each said tab is:

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connected at a first end to the positive electrode or the negative electrode, and at a second end to said positive terminal or said negative terminal by pressure attachment;

connected at a first end to the positive electrode or the negative electrode, and at a second end to said positive terminal or said negative terminal by welding; or

connected at a first end to the positive electrode or the negative electrode, and comprises at a second end an eyelet which is connected to said positive terminal or said negative terminal.

18. (Amended) The lithium secondary battery according to claim 14, wherein battery capacity is not less than 5 Ah.

20. (Amended) The lithium secondary battery according to claim 14, wherein the battery is used for an electric vehicle or a hybrid electric vehicle.

22. (Amended Three Times) The lithium secondary battery according to claim 14, wherein said tabs connected to the positive electrode are selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than  $0.014 \text{ cm}^2$ , copper tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than  $0.008 \text{ cm}^2$  and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than  $0.008 \text{ cm}^2$  and wherein said tabs connected to the negative electrode are selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than  $0.014 \text{ cm}^2$ , copper tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than  $0.008 \text{ cm}^2$ , and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than  $0.008 \text{ cm}^2$ .

23. (Twice Amended) The lithium secondary battery according to claim 14, wherein a thickness of a tab is not more than a thickness of an electrode active material layer in an electrode to which the tabs are welded.

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24. (Twice Amended) The lithium secondary battery according to claim ~~4~~22, wherein a thickness of a tab is not more than a thickness of an electrode active material layer in an electrode to which the tabs are welded.

26. (Amended Three Times) The lithium secondary battery according to claim ~~4~~4, wherein said tabs connected to the positive electrode are selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than  $0.014 \text{ cm}^2$  and not more than  $0.18/R \text{ (cm}^2\text{)}$ ,  $R$  being internal resistance, in mS, of a unit battery, copper tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than  $0.008 \text{ cm}^2$  and not more than  $0.09/R \text{ cm}^2$ , and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the positive electrode is not less than  $0.008 \text{ cm}^2$  and not more than  $0.07/R \text{ cm}^2$  and wherein said tabs connected to the negative electrode are selected from among aluminum tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than  $0.014 \text{ cm}^2$  and not more than  $0.18/R \text{ (cm}^2\text{)}$ , copper tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than  $0.008 \text{ cm}^2$  and not more than  $0.09/R \text{ cm}^2$ , and nickel tabs wherein a total cross-sectional area of all of said tabs connected to the negative electrode is not less than  $0.008 \text{ cm}^2$  and not more than  $0.07/R \text{ cm}^2$ .